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Selected Areas in Communications, IEEE Journal on, Volume: 19, Issue: 10, 2001

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[\[Abstract\]](#) [\[PDF Full-Text \(208 KB\)\]](#) **IEEE JNL****2 Comparative analysis of different models of checkpointing and recovery***Nicola, V.F.; van Spanje, J.M.;*

Software Engineering, IEEE Transactions on, Volume: 16, Issue: 8, Aug. 1994

Pages: 807 - 821

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Communications, Computers and Signal Processing, 1997. '10 Years PACRIM : 1997 - Networking the Pacific Rim'. 1997 IEEE Pacific Rim Conference on, Vol 2, 20-22 Aug. 1997

Pages: 663 - 668 vol.2

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1 Recovery guarantees for Internet applications

Roger Barga, David Lomet, German Shegalov, Gerhard Weikum

August 2004 **ACM Transactions on Internet Technology (TOIT)**, Volume 4 Issue 3

Full text available: [pdf\(997.52 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Internet-based e-services require application developers to deal explicitly with failures of the underlying software components, for example web servers, servlets, browser sessions, and so forth. This complicates application programming, and may expose failures to end users. This paper presents a framework for an application-independent infrastructure that provides recovery guarantees and masks almost all system failures, thus relieving the application programmer from having to deal with these f ...

Keywords: Exactly-once execution, application recovery, communication protocols, interaction contracts


2 Research sessions: query optimization: Robust query processing through progressive optimization

Volker Markl, Vijayshankar Raman, David Simmen, Guy Lohman, Hamid Pirahesh, Miso Cilimdzic

June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data**

Full text available: [pdf\(331.15 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Virtually every commercial query optimizer chooses the best plan for a query using a cost model that relies heavily on accurate cardinality estimation. Cardinality estimation errors can occur due to the use of inaccurate statistics, invalid assumptions about attribute independence, parameter markers, and so on. Cardinality estimation errors may cause the optimizer to choose a sub-optimal plan. We present an approach to query processing that is extremely robust because it is able to detect and re ...


3 BASE: Using abstraction to improve fault tolerance

Miguel Castro, Rodrigo Rodrigues, Barbara Liskov

August 2003 **ACM Transactions on Computer Systems (TOCS)**, Volume 21 Issue 3

Full text available: [pdf\(438.18 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Software errors are a major cause of outages and they are increasingly exploited in

malicious attacks. Byzantine fault tolerance allows replicated systems to mask some software errors but it is expensive to deploy. This paper describes a replication technique, BASE, which uses abstraction to reduce the cost of Byzantine fault tolerance and to improve its ability to mask software errors. BASE reduces cost because it enables reuse of off-the-shelf service implementations. It improves availability ...

Keywords: Byzantine fault tolerance, N-version programming, asynchronous systems, proactive recovery, state machine replication

4 [A "flight data recorder" for enabling full-system multiprocessor deterministic replay](#)

Min Xu, Rastislav Bodik, Mark D. Hill

May 2003 **ACM SIGARCH Computer Architecture News , Proceedings of the 30th annual international symposium on Computer architecture**, Volume 31 Issue 2

Full text available:  pdf(311.95 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

Debuggers have been proven indispensable in improving software reliability. Unfortunately, on most real-life software, debuggers fail to deliver their most essential feature --- a faithful replay of the execution. The reason is non-determinism caused by multithreading and non-repeatable inputs. A common solution to faithful replay has been to record the non-deterministic execution. Existing recorders, however, either work only for datarace-free programs or have prohibitive overhead. As a step tow ...

5 [Run-time adaptation in river](#)

Remzi H. Arpacı-Dusseau

February 2003 **ACM Transactions on Computer Systems (TOCS)**, Volume 21 Issue 1

Full text available:  pdf(849.04 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present the design, implementation, and evaluation of run-time adaptation within the River dataflow programming environment. The goal of the River system is to provide adaptive mechanisms that allow database query-processing applications to cope with performance variations that are common in cluster platforms. We describe the system and its basic mechanisms, and carefully evaluate those mechanisms and their effectiveness. In our analysis, we answer four previously unanswered and important que ...

Keywords: Performance availability, clusters, parallel I/O, performance faults, robust performance, run-time adaptation

6 [SafetyNet: improving the availability of shared memory multiprocessors with global checkpoint/recovery](#)

Daniel J. Sorin, Milo M. K. Martin, Mark D. Hill, David A. Wood

May 2002 **ACM SIGARCH Computer Architecture News**, Volume 30 Issue 2

Full text available:  pdf(1.28 MB)  Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We develop an availability solution, called *SafetyNet*, that uses a unified, lightweight checkpoint/recovery mechanism to support multiple long-latency fault detection schemes. At an abstract level, *SafetyNet* logically maintains multiple, globally consistent checkpoints of the state of a shared memory multiprocessor (i.e., processors, memory, and coherence permissions), and it recovers to a pre-fault checkpoint of the system and re-executes if a fault is detected. *SafetyNet* e ...

Keywords: availability, shared memory, multiprocessor

7 Compactly encoding unstructured inputs with differential compression

Miklos Ajtai, Randal Burns, Ronald Fagin, Darrell D. E. Long, Larry Stockmeyer
May 2002 **Journal of the ACM (JACM)**, Volume 49 Issue 3

Full text available:  pdf(348.32 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The subject of this article is *differential compression*, the algorithmic task of finding common strings between versions of data and using them to encode one version compactly by describing it as a set of changes from its companion. A main goal of this work is to present new differencing algorithms that (i) operate at a fine granularity (the atomic unit of change), (ii) make no assumptions about the format or alignment of input data, and (iii) in practice use linear time, use constant spa ...

Keywords: Delta compression, differencing, differential compression

8 Multithreading and value prediction: Speculative lock elision: enabling highly concurrent multithreaded execution

Ravi Rajwar, James R. Goodman

December 2001 **Proceedings of the 34th annual ACM/IEEE international symposium on Microarchitecture**

Full text available:

 pdf(1.37 MB) 

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

[Publisher Site](#)

Serialization of threads due to critical sections is a fundamental bottleneck to achieving high performance in multithreaded programs. Dynamically, such serialization may be unnecessary because these critical sections could have safely executed concurrently without locks. Current processors cannot fully exploit such parallelism because they do not have mechanisms to dynamically detect such false inter-thread dependences. We propose *Speculative Lock Elision (SLE)*, a novel micro-architecture ...

9 External memory algorithms and data structures: dealing with

massive data

Jeffrey Scott Vitter

June 2001 **ACM Computing Surveys (CSUR)**, Volume 33 Issue 2

Full text available:  pdf(828.46 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Data sets in large applications are often too massive to fit completely inside the computers internal memory. The resulting input/output communication (or I/O) between fast internal memory and slower external memory (such as disks) can be a major performance bottleneck. In this article we survey the state of the art in the design and analysis of external memory (or EM) algorithms and data structures, where the goal is to exploit locality in order to reduce the I/O costs. We consider a varie ...

Keywords: B-tree, I/O, batched, block, disk, dynamic, extendible hashing, external memory, hierarchical memory, multidimensional access methods, multilevel memory, online, out-of-core, secondary storage, sorting

10 A new approach to developing and implementing eager database replication protocols

Bettina Kemme, Gustavo Alonso

September 2000 **ACM Transactions on Database Systems (TODS)**, Volume 25 Issue 3

Full text available:  pdf(449.43 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Database replication is traditionally seen as a way to increase the availability and performance of distributed databases. Although a large number of protocols providing data consistency and fault-tolerance have been proposed, few of these ideas have ever been used in commercial products due to their complexity and performance implications. Instead, current products allow inconsistencies and often resort to centralized approaches which eliminates some of the advantages of replication. As an ...

Keywords: database replication, fault-tolerance, group communication, isolation levels, one-copy-serializability, replica control, total error multicast

11 Main memory database recovery

Margaret H. Eich

November 1999 **Proceedings of 1986 ACM Fall joint computer conference**

Full text available:  pdf(794.07 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

12 CARAT: a testbed for the performance evaluation of distributed database systems

Walt Kohler, Bao-Chyuan Jenq

November 1999 **Proceedings of 1986 ACM Fall joint computer conference**

Full text available:  pdf(1.21 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

13 Database research at the University of Oklahoma

Le Gruenwald, Leonard Brown, Ravi Dirckze, Sylvain Guinepain, Carlos Sanchez, Brian Summers, Sirirut Vanichayobon

September 1999 **ACM SIGMOD Record**, Volume 28 Issue 3

Full text available:  pdf(627.13 KB) Additional Information: [full citation](#), [index terms](#)

14 Garbage collection for a client-server persistent object store

Laurent Amsaleg, Michael J. Franklin, Olivier Gruber

August 1999 **ACM Transactions on Computer Systems (TOCS)**, Volume 17 Issue 3

Full text available:  pdf(267.18 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

We describe an efficient server-based algorithm for garbage collecting persistent object stores in a client-server environment. The algorithm is incremental and runs concurrently with client transactions. Unlike previous algorithms, it does not hold any transactional locks on data and does not require callbacks to clients. It is fault-tolerant, but performs very little logging. The algorithm has been designed to be integrated into existing systems, and therefore it works with standard i ...

Keywords: client-server system, logging, persistent object-store, recovery

15 Comparison of access methods for time-evolving data

Betty Salzberg, Vassilis J. Tsotras

June 1999 **ACM Computing Surveys (CSUR)**, Volume 31 Issue 2

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index](#)

Full text available:  pdf(529.53 KB)

[terms](#)

This paper compares different indexing techniques proposed for supporting efficient access to temporal data. The comparison is based on a collection of important performance criteria, including the space consumed, update processing, and query time for representative queries. The comparison is based on worst-case analysis, hence no assumptions on data distribution or query frequencies are made. When a number of methods have the same asymptotic worst-case behavior, features in the methods tha ...

Keywords: I/O performance, access methods, structures, temporal databases

16 Xmas: an extensible main-memory storage system for high-performance applications 

Jang Ho Park, Yong Sik Kwon, Ki Hong Kim, Sang Ho Lee, Byoung Dae Park, Sang Kyun Cha
June 1998 **ACM SIGMOD Record, Proceedings of the 1998 ACM SIGMOD international conference on Management of data**, Volume 27 Issue 2

Full text available:  pdf(374.70 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Xmas is an extensible main-memory storage system for high-performance embedded database applications. Xmas not only provides the core functionality of DBMS, such as data persistence, crash recovery, and concurrency control, but also pursues an extensible architecture to meet the requirements from various application areas. One crucial aspect of such extensibility is that an application developer can compose application-specific, high-level operations with a basic set of operations provided ...

17 Concurrency control: methods, performance, and analysis 

Alexander Thomasian
March 1998 **ACM Computing Surveys (CSUR)**, Volume 30 Issue 1

Full text available:  pdf(427.18 KB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: Markov chains, adaptive methods, concurrency control, data contention, deadlocks, flow diagrams, load control, optimistic concurrency control, queueing network models, restart-oriented locking methods, serializability, thrashing, two-phase locking, two-phase processing, wait depth limited methods

18 A flexible and recoverable client/server database event notification system 

Eric N. Hanson, I.-Cheng Chen, Roxana Dastur, Kurt Engel, Vijay Ramaswamy, Wendy Tan, Chun Xu
February 1998 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 7 Issue 1

Full text available:  pdf(105.38 KB)

Additional Information: [full citation](#), [abstract](#), [index terms](#)

A software architecture is presented that allows client application programs to interact with a DBMS server in a flexible and powerful way, using either direct, volatile messages, or messages sent via recoverable queues. Normal requests from clients to the server and replies from the server to clients can be transmitted using direct or recoverable messages. In addition, an application event notification mechanism is provided, whereby client applications running anywhere on the network can regist ...

19 An overview of data warehousing and OLAP technology 

Surajit Chaudhuri, Umeshwar Dayal
March 1997 **ACM SIGMOD Record**, Volume 26 Issue 1

Full text available:

Additional Information:

 pdf(101.60 KB)

[full citation](#), [abstract](#), [citations](#), [index terms](#)

Data warehousing and on-line analytical processing (OLAP) are essential elements of decision support, which has increasingly become a focus of the database industry. Many commercial products and services are now available, and all of the principal database management system vendors now have offerings in these areas. Decision support places some rather different requirements on database technology compared to traditional on-line transaction processing applications. This paper provides an overview ...

20 [Extended ephemeral logging: log storage management for applications with long lived transactions](#) 

John S. Keen, William J. Dally

March 1997 **ACM Transactions on Database Systems (TODS)**, Volume 22 Issue 1

Full text available:  pdf(566.34 KB) Additional Information: [full citation](#), [references](#), [index terms](#), [review](#)

Keywords: OLTP, disk management, logging, long transactions

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